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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/785,944	FERMANN, MARTIN E.	
	Examiner	Art Unit	
	Hrayr A. Sayadian	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50 and 55-58* is/are pending in the application.

4a) Of the above claim(s) *9,12,27-29,47-49 and 58* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8, 10, 11, 13-26, 30-46, 50, and 55-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :,3/13/2006,3/27/206,4/14/2006,4/17/2006,6/12/2006.

DETAILED ACTION

Election Requirement

1. Applicant is required under 35 U.S.C. § 121 to elect a single disclosed species from the ones described below.

2. This application and pending claims 1-50 and 55-58 are directed to the following patentably distinct species:

A1. An embodiment described in [0047]-[0061] (the First Embodiment, as described with respect to FIG. 1A[sic]). The mutually exclusive characteristics for Species A1 is/are described in [0055]. Specifically, this embodiment is directed to end pumped multimode fiber.

A2. An embodiment described in [0062] (the alterative Embodiment, as described with respect to FIG. 4). The mutually exclusive characteristics for Species A2 is/are described in [0062]. Specifically, this embodiment is directed to side pumped multimode fiber.

B1. An embodiment described in [0047]-[0062] (the First Embodiment, as described with respect to FIGs. 1 and 4). The mutually exclusive characteristics for Species B1 is/are the using of a single mode fiber.

B2. An embodiment described in [0063] – [0065] (the alternative Embodiment, as described with respect to FIG. 5). The mutually exclusive characteristics for Species B2 is/are described in [0063]. Specifically, this embodiment is directed to using two single mode fibers, one of these single mode fibers have positive dispersion.

B21. An embodiment described in [0064] (as described with respect to FIG. 5). The mutually exclusive characteristics for Species B21 is/are described in [0064]. Specifically, this embodiment is directed to using two single mode fibers, with a total dispersion inside the cavity being adjusted to be zero.

B22. An embodiment described in [0064] (as described with respect to FIG. 5). The mutually exclusive characteristics for Species B2 is/are described in [0064]. Specifically, this embodiment is directed to using two single mode fibers, with a total dispersion inside the cavity being adjusted to be positive.

B221. An embodiment described in [0066] (as described with respect to FIG. 5). The mutually exclusive characteristics for Species B221 is/are described in [0066]. Specifically, this embodiment is directed to using two single mode fibers, with a total dispersion inside the cavity being adjusted to be positive using a periodically poled LiNBO3.

B222. An embodiment described in [0066] (as described with respect to FIG. 5). The mutually exclusive characteristics for Species B222 is/are described in [0066]. Specifically, this embodiment is directed to using two single mode fibers, with a total dispersion inside the cavity being adjusted to be positive using bulk-optics dispersion compensation elements.

B223. An embodiment described in [0067] (as described with respect to FIG. 5). The mutually exclusive characteristics for Species B223 is/are described in [0067]. Specifically, this embodiment is directed to using two single mode fibers, with a total dispersion inside the cavity being adjusted to be positive using frequency doubling.

B224. An embodiment described in [0067] (as described with respect to FIG. 5). The mutually exclusive characteristics for Species B224 is/are described in [0067]. Specifically, this embodiment is directed to using two single mode fibers, with a total dispersion inside the cavity being adjusted to be positive using Raman generation.

B225. An embodiment described in [0067] (as described with respect to FIG. 5). The mutually exclusive characteristics for Species B225 is/are described in [0067]. Specifically, this embodiment is directed to using two single mode fibers, with a total dispersion inside the cavity being adjusted to be positive using four-wave mixing.

C1. An embodiment described in [0068] (the alternative Embodiment, as described with respect to FIG. 6). The mutually exclusive characteristics for Species C1 is/are described in [0068]. Specifically, this embodiment is directed to inserting a chirped fiber grating such as a Bragg grating 83.

C2. An embodiment indirectly described with in [0068]. The mutually exclusive characteristics for Species C2 is/are described in [0068]. Specifically, this embodiment is directed to NOT inserting a chirped fiber grating such as a Bragg grating 83.

D1. An embodiment indirectly described with in [0070]. The mutually exclusive characteristics for Species D1 is/are described in [0070]. Specifically, this embodiment is directed to using polarization non- maintaining multi-mode fiber.

D2. An embodiment indirectly described with in [0070]. The mutually exclusive characteristics for Species D2 is/are described in [0070]. Specifically, this embodiment is directed to using polarization maintaining multi-mode fiber having an elliptical core (see, for example, FIG. 7a).

D3. An embodiment indirectly described with in [0070]. The mutually exclusive characteristics for Species D3 is/are described in [0070]. Specifically, this embodiment is directed to using polarization maintaining multi-mode fiber that is stressed (see, for example, FIG. 7b).

E1. An embodiment indirectly described with in [0071]. The mutually exclusive characteristics for Species E1 is/are described in [0071]. Specifically, this embodiment is directed to coupling between the multi-mode and single mode fibers being through bulk optics in free space (see, for example, FIG. 9a).

E2. An embodiment indirectly described with in [0071]. The mutually exclusive characteristics for Species E2 is/are described in [0071]. Specifically, this embodiment is directed to coupling between the multi-mode and single mode fibers being through a splice (see, for example, FIG. 9b).

E3. An embodiment indirectly described with in [0071]. The mutually exclusive characteristics for Species E3 is/are described in [0071]. Specifically, this embodiment is directed to coupling between the multi-mode and single mode fibers being through a taper (see, for example, FIG. 9c).

F1. An embodiment indirectly described with in [0072]. The mutually exclusive characteristics for Species F1 is/are described in [0072]. Specifically, this embodiment is directed to using a single mode fiber to limit the power to the fundamental mode of the multi-mode.

F2. An embodiment indirectly described with in [0072]. The mutually exclusive characteristics for Species F2 is/are described in [0072]. Specifically, this embodiment is directed to using a multi-mode fiber having Bragg grating written into it to limit the power to the fundamental mode of the multi-mode fiber.

G1. An embodiment indirectly described with in [0073]. The mutually exclusive characteristics for Species G1 is/are described in [0073]. Specifically, this embodiment is directed to passive mode-locking.

G2. An embodiment indirectly described with in [0073]. The mutually exclusive characteristics for Species G2 is/are described in [0073]. Specifically, this embodiment is directed to active mode-locking.

3. Applicant was required under 35 U.S.C. 121 to elect a single disclosed species ((one of A1 or A2), and (one of B1, B21, B221, B222, B223, B224, or B225), and (one of C1 or C2), and (one of D1, D2, or D3), and (one of E1, E2, E3), and (one of F1 or F2), and (one of G1 or G2)), even though this requirement is traversed. Applicant was advised that a reply to this requirement must include:

1. an identification of the species that is elected consonant with this requirement, and
2. a listing of all claims readable thereon, including any claims subsequently added.

Applicant was advised that an argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

If claims are added after the election, Applicant was required to indicate which are readable upon the elected species. M.P.E.P. § 809.02(a).

Upon the allowance of a generic claim, Applicant was informed that this application will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

4. Responding on 6/21/2006 to an Election Requirement dated 4/28/2006 Applicant has elected without traverse the prosecution of claims 1-8, 10, 11, 13-26, 30-46, 5, and 55-57 directed to Species A2B1C1D1E2F1G1.

Accordingly, claims 9, 12, 27-29, 47-49, and 58 are withdrawn from further consideration by the examiner as being drawn to a non-elected invention. See, 37 C.F.R. § 1.142(b).

The Election Requirement is maintained and is now made final.

Information Disclosure Statement

5. The Examiner has considered the voluminous references submitted as part of the Information Disclosure Statements (IDS) to the extent required by M.P.E.P. §609.05(b). Applicant is requested to point the specific pertinence in the response to this Office action.

The following is an excerpt from M.P.E.P. §609.04(a)III:

> Although a concise explanation of the relevance of the information is not required for English language information, applicants are encouraged to provide a concise explanation of why the English-language information is being submitted and how it is understood to be relevant. Concise explanations (especially those which point out the relevant pages and lines) are helpful to the Office, particularly where documents are lengthy and complex and applicant is aware of a section that is highly relevant to patentability or where a large number of documents are submitted and applicant is aware that one or more are highly relevant to patentability.

Applicant is reminded of M.P.E.P. § 2004 (presenting "Aids to Compliance With Duty of Disclosure," including "helpful suggestions for avoiding duty of disclosure problems") and the specific suggestion in § 2004 ¶ 13, stating:

> It is desirable to avoid the submission of long lists of documents if it can be avoided. Eliminate clearly irrelevant and marginally pertinent cumulative information. If a long list is submitted, highlight those documents which have been specifically brought to applicant's attention and/or are known to be of most significance. See *Penn Yan Boats, Inc. v. Sea Lark Boats, Inc.*, 359 F. Supp. 948, 175 USPQ 260 (S.D. Fla. 1972), *aff'd,* 479 F.2d 1338, 178 USPQ 577 (5th Cir. 1973), *cert. denied,* 414 U.S. 874 (1974). But cf. *Molins PLC v. Textron Inc.*, 48 F.3d 1172, 33 USPQ2d 1823 (Fed. Cir. 1995).

6. The Examiner has considered the opinions of third party counsel. The Examiner notes that "consideration ... of the information submitted in an IDS means nothing more than considering the documents in the same manner as other documents in Office search files are considered by the [E]xaminer while conducting a search of the prior art in a proper field of search. The initials of the [E]xaminer placed adjacent to the citations on the PTO-1449 or PTO/SB/08A and 08B or its equivalent mean that the information has been considered by the [E]xaminer to the extent noted above." See, M.P.E.P. §609.

Claim Rejections - 35 U.S.C. § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 2-6, 16, 19-21, 30, 35, 38, and 39 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter Applicant regards as the invention.

Specifically: in claims 2-6 and 19-21, the recitations "said mode locking mechanism" lack antecedent bases; in claims 16 and 30, the recitations "said ultra-short optical pulses" lack antecedent bases; in claim 35, the recitation "the core diameter of said optical fiber" lack antecedent basis; in claim 35, additionally, the recitation "said optical fiber" lacks proper antecedent bases because there are two "optical fiber" recitations introduced, one in claim 1 and another in claim 34; and in claim 38 (and claim 39 by dependence on claim 38), the recitation "said mode filter excites" is either indefinite or lacks recitation of necessary structural features because a filter acts by inhibiting filtered wavelengths/frequencies/modes.

Correction is required.

Claim Rejections - 35 U.S.C. § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102, the bases for the anticipation rejections set forth in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article

21(2) of such treaty in the English language. (applied to US or PCT references filed AFTER 11/29/2000).

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent. (applied to US or PCT references filed BEFORE 11/29/2000).

10. Claims 1-4, 7, 16-19, 22-26, 30-41, 46, 50, and 55-57 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 5,627,848 to Fermann et al. [hereinafter Fermann I]. U.S. Pat. No. 4,829,529 to Kafka [hereinafter "Kafka"] is cited to show the scope of the recitation "multi-mode fiber."

With respect to Claims 1, 30, 46:

As to claim interpretation: The recitation "multi-mode optical fiber" includes fibers wherein multi-modes exist. See, for example, paragraph [0047] of the present application. Cladding of fibers also guides modes. See, for example, supra, As such, the recitation "multi-mode optical fibers" is read broadly to include fibers that guide multi-modes, whether through the core or within the cladding. See also Kafka, disclosing a fiber comprising a central core that is single-mode, within a surrounding area that is multi-mode, surrounded by cladding.

Additionally, the recitation "an optical guide ... which confines the light to preferentially the fundamental mode of said multi-mode fiber" has a scope including a single mode fiber (which inherently confines light to the fundamental mode) and a mode stripper (which Fermann I discloses as striping away cladding modes).

As to art rejection: Fermann I discloses a double clad multi-mode fiber 101 having a gain medium. Fiber 101 is coupled to an optical guide (either of single-mode fiber 201, or mode stripper 104), which confines the light to preferentially the fundamental mode of the multi-mode fiber.

See the Abstract in Fermann I disclosing the generation of 560 femto-second (sub-pico-second) pulses.

And Fermann I discloses the fiber 101 including a core with a gain medium concentrated centrally within the core.

With respect to Claims 2-4:

Fermann I discloses a passive mode-locking element 118 that comprises InGaAsP.

With respect to Claims 7 and 36:

Fermann I discloses a single-mode fiber 201 that inherently acts as a mode filter because it guides a single mode.

With respect to Claim 16:

Fermann I discloses a polarization beam splitter 117 for output coupling pulses from the laser.

With respect to Claim 17:

Fermann I discloses a pair of reflectors (any of (105, 107), (202, 107), (202, 303), (601, 107), and (107, 701)).

With respect to Claim 18:

Fermann I discloses one of the pair of reflectors being partially reflecting (for example, 107 of the pair (107, 701).

With respect to Claim 19:

Fermann I discloses a mode-locking mechanism 118 on mirror 107.

With respect to Claims 22-24:

Fermann I discloses a linear phase drift compensator comprising Faraday rotators 113 and 114.

With respect to Claim 25, 26:

Fermann I discloses a linear phase drift compensator comprising a wave plate (for example, 114, or 116).

With respect to Claim 31-33:

Fermann I discloses an environmental stabilizer (using birefringent fiber along with the Faraday rotators).

With respect to Claims 34 and 35:

Fermann I discloses the optical guide comprising an optical fiber doped with an amplifying medium (the mode stripper 104). The mode stripper 104 includes a gain/amplifying medium concentrated centrally. With respect to claim 35, the recitation "fraction of the core" (attendant with the 112 rejection above) has a scope broad enough to read on the single mode fiber of the stripper 104 (which single mode fiber is concentrated centrally within a fraction of the core of the cladding core forming the stripper 104. Additionally, it is also noted that the recitation "fraction" has a scope including the "whole."

With respect to Claims 37-39:

Fermann I discloses the mode stripper 104 which acts as a mode-filter because it strips away the cladding modes. The mode stripper has the gain medium of fiber 101, which excites the fundamental mode. The recitation of "an efficiency of at least 90%" is always true because it lacks a comparison for the efficiency number to have a limited scope; accordingly, its scope includes the efficiency being compared with the gain medium exciting the fundamental mode, which is 100% of its function.

With respect to Claims 40 and 41:

Fermann I discloses a single mode fiber 201 that has a positive dispersion.

With respect to Claim 50:

Fermann I discloses a grating 701 written on fiber 101, the grating reflecting primarily the fundamental mode because the invention of Fermann I produces primarily the fundamental mode of the fiber 101.

With respect to Claim 55:

Fermann I additionally discloses fiber 101 to be bent.

With respect to Claims 56 and 57:

See above the rejection of claims 2 and 7, respectively.

11. Claims 1, 7, 8, 17, 18, 34-39, 46, and 50 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 5,422,897 to Wyatt et al. [hereinafter "Wyatt"]. Federal Standard

FS-1037C (Telecommunications: Glossary of Telecommunication Terms) is presented to show definition of some terms in the technological arts.

With respect to Claims 1 and 46:

As to claim interpretation: Cladding is broadly read to include a region having index of refraction that is lower than what it surrounds. See, for example FS-1037C defining "cladding." And Wyatt discloses regions. See, for example, the regions around the central portions of fibers 1 and 2; these regions would have lower higher indexes of refraction lest guiding/confining of light fails.

As to art rejection: Wyatt discloses a multi-mode fiber 1 having a cladding and doped with a gain medium; a pump 3 coupled to the cladding and exciting the gain medium; an optical guide 2 confining light preferentially to the fundamental mode of the multi-mode fiber 1.

Wyatt also discloses the fiber 1 including a core with the gain medium concentrated centrally within the core.

With respect to Claims 7, 8, and 36:

Wyatt discloses a single-mode fiber 2 that inherently acts as a mode filter because it guides a single mode. And the single-mode fiber 2 is fusion spliced to the multi-mode fiber 1.

With respect to Claim 17:

Wyatt discloses a pair of reflectors (g1, g2).

With respect to Claim 18:

Wyatt discloses one of the pair of reflectors (g2).

With respect to Claims 34 and 35:

Wyatt discloses the optical guide comprising an optical fiber doped with an amplifying medium (the mode stripper 104). The mode stripper 104 includes a gain/amplifying medium concentrated centrally. With respect to claim 35, the recitation "fraction of the core" (attendant with the 112 rejection above) has a scope broad enough to read on the single mode (SM) fiber 2 and the multi-mode (MM) fiber 1; in either case, the gain medium in Wyatt is concentrated centrally within a fraction of the core of the

cladding. Additionally, it is also noted that the recitation "fraction" has a scope including the "whole."

With respect to Claims 37-39:

Wyatt discloses the SM fiber 2 acting as a mode-filter because it is a single mode fiber guiding the fundamental mode of the M fiber 1. And the SM fiber 2 has a gain medium, which excites the fundamental mode of the MM fiber 1. The recitation of "an efficiency of at least 90%" is always true because it lacks a comparison for the efficiency number to have a limited scope; accordingly, its scope includes the efficiency being compared with the gain medium exciting the fundamental mode, which is 100% of its function.

With respect to Claim 50:

Wyatt discloses a grating g1 written on the MM fiber 1, which grating g1 reflects primarily the fundamental mode of MM fiber 1.

12. Claims 1, 7, 13, 14, 16-18, 22, 23, 25, 30-32, 34-38, 46, and 50 are rejected under 35 U.S.C. § 102(a and e) as being anticipated by U.S. Pat. No. 5818,630 to Fermann et al. [hereinafter Fermann II].

Fermann II clearly discloses all of the features recited in the above claims. See, for example, the FIGs. and the claims of Fermann II. Side pumping is disclosed in column 10, lines 33-36.

Claim Rejections - 35 U.S.C. § 103

13. The following is a quotation of 35 U.S.C. § 103(a), the basis for the obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section § 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 5, 6, 20, and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fermann I.

With respect to claims 5 and 6:

Fermann I explicitly discloses using neither a power limiter nor a two-photon absorber. Fermann I, however, discloses using InGaAsP as the mode-locker. It is well known to use InP substrate with InGaAsP layers to avoid lattice mismatch problems. And InP is subject to two-photon absorption, which absorption inherently reduces (therefore limiting) the light intensity.

To avoid lattice mismatch problems therefore it would have been obvious to use InP as the substrate supporting InGaAsP passive mode-locker.

15. Claims 8-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fermann I in view of U.S. Pat. No. 5,074,633 to Cohen et al. [hereinafter "Cohen"].

Fermann I does not explicitly disclose using fusion splice tapered connection of the fibers. Cohen however discloses fusion splicing and tapering different fibers, which tapered splicing results in taper regions substantially free of constrictions and a splice with having relatively low optical losses. See, for example, the Abstract and the figure as shown on the front page of Cohen. Because of continuity at the splice, tapering will occur in both fibers.

16. Claims 13-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fermann I in view of "V-Groove Side Pumped 1.5 micron Fiber Amplifier," by Goldberg et al., CLEO 1996 [hereinafter "Goldberg"].

Fermann I fails to explicitly disclose side pumping using a V-groove. Goldberg however discloses v-groove side pumping to keep the fiber ends unobstructed and be able to use multiple pumping sites (thus increase the pumping power. See, for example, the second paragraph of Goldberg describing the method's advantages. Additionally it is noted that the coupling is optical.

To keep the fiber ends unobstructed and increase the pumping power therefore it would have been obvious to use v-groove side pumping.

17. Claim 42 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Fermann I in view of either U.S. Pat. No. 5,696,782 to Harter et al. [hereinafter "Harter I"] or "All-Fiber Femto-second Pulse ...," Appl. Phys. Letter 66, (1995), pp-1053-1055, by Galvanauskas et al. [hereinafter "Galvanauskas I"].

Fermann I fails to specifically disclose an output coupler limiting the light energy at the single mode fiber to less than 10% of the peak power in said cavity. It is well known however that single mode fibers are sensitive to peak powers. It is also well known to use output couplers (the scope of recitation "output coupler" is treated broadly to include elements before and after the output coupler) limiting the power in single mode fibers to protect them. See, for example either of Harter I (FIG. 4) or Galvanauskas I. To protect the single mode fiber therefore it would have been obvious to use an output coupler to reduce the peak power.

Additionally, since reducing the power is art recognized result-effecting variables/parameters, as per established patent law precedent (see, for example M.P.E.P. § 2144.05) therefore it would have been obvious to optimize (for example by routine experimentation) the peak power in the single mode fiber to be less than 10% of the peak power in the cavity.

18. Claims 43-45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fermann I in view of either Harter I or Galvanauskas I, further in view of U.S. Pat. No. 5,815,307 to Arbore et al. [hereinafter "Arbore"] and "Fiber-laser-based Femtosecond ...," Optics Letter, 22 (1997), pp105-107, by Galvanauskas et al. [hereinafter "Galvanauskas II"].

The combination of Fermann I with Harter I or with Galvanauskas I fails to specifically disclose using a chirped periodically polled LiNbO3. Arbore however discloses using a LiNbO3 having chirped grating to simultaneously chirp adjust (and thus compress) and frequency double ultra-short pulses. See, for example the front page. Arbore also recognizes the importance of both compressing pulses and controlling their

frequency. Both Arbore and Galvanauskas II recognize the benefit of using periodically poled LiNbO3 for harmonic generation because of its large nonlinear coefficient. To simultaneously chirp adjust (and thus compress) and frequency double pulses using a large non-linear coefficient (and therefore an efficient) material therefore it would have been obvious to modify the combination of Fermann I with Harter I or with Galvanauskas I to use PPLN as a frequency doubler and a pulse compressor.

19. Claims 2-6, 19, 20, 21, and 30 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann I, as motivated by "Saturable Absorber Modelocked ...," by De Souza, et al., Electronics Letters, 29 (1993) pp. 447-449 [hereinafter "De Souza"].

Wyatt does not disclose modelocking. Fermann I however discloses modelocking to initiate production of short pulses (see, for example, claim 10). And De Souza discloses using InGaAsP on InP substrate as the passive modelocker because it has both fast and slow recovery mechanism (see, for example, De Souza, the paragraph below FIG. 3 on page 448). And the result of fast recovery due to InGaAsP is modelocked pulses shorter than 500 pico-second. To initiate production of short pulses by a mechanism having short and fast recovery, therefore, it would have been obvious to modify the disclosure of Wyatt by including modelocking by InGaAsP.

19. Claims 16, 22-26, 31-33, 40, and 41 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann I.

With respect to claims 16, 22-26, 31-33:

Wyatt does not disclose the features recited in these claims. Fermann I however discloses these features to compensate for linear and non-linear phase drifts. See, for example, claims 6, 7, 9, and 12.

With respect to claims 40 and 41:

Wyatt does not disclose compensating for dispersion. Fermann I however discloses using a length of a single mode fiber having positive dispersion to compensate for the negative dispersion that might exist. To compensate for negative dispersion

therefore it would have been obvious to modify the disclosure of Wyatt by the disclosure of Fermann I.

20. Claims 55 and 57 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann I or in view of U.S. Pat. No. 4,832,437 to Kim et al. [hereinafter "Kim"].

Wyatt does not disclose bending the multi-mode fiber. Fermann I however discloses that bending the fiber 101 minimizes non-linear polarization changes. To minimize non-linear polarization changes therefore it would have been obvious bend the multi-mode fiber.

Alternatively, Kim discloses coiling multi-mode fiber to strip light in higher order modes without striping light in the fundamental mode. See, for example, column 5, lines 39-45. To strip away higher order modes therefore it would have been obvious to coil (which inherently includes bending) the multi-mode fiber.

The single mode fiber disclosed in Wyatt filters the light.

21. Claim 56 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann I or Kim, further in view of Fermann I.

Wyatt, as modified by Fermann I or Kim, does not disclose mode-locking the laser. Fermann I however discloses modelocking to initiate production of short pulses (see, for example, claim 10). To initiate production of short pulses therefore it would have been obvious to modify Wyatt, as modified by Fermann I or Kim, by including mode-locking.

22. Claims 9-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Cohen.

Wyatt does not explicitly disclose using fusion splice tapered connection of the fibers. Cohen however discloses fusion splicing and tapering different fibers, which tapered splicing results in taper regions substantially free of constrictions and a splice with having relatively low optical losses. See, for example, the Abstract and the figure as shown on the front page of Cohen. Because of continuity at the splice, tapering will occur in both fibers.

23. Claims 13-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Goldberg.

Wyatt fails to explicitly disclose side pumping using a V-groove. Goldberg however disclose v-groove side pumping to keep the fiber ends unobstructed and be able to use multiple pumping sites (thus increase the pumping power. See, for example, the second paragraph of Goldberg describing the method's advantages. Additionally it is noted that the coupling is optical.

To keep the fiber ends unobstructed and increase the pumping power therefore it would have been obvious to use v-groove side pumping.

24. Claim 42 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of view of Fermann I, further in view of Harter I or Galvanauskas I.

The combination of Wyatt and Furman I fails to specifically disclose an output coupler limiting the light energy at the single mode fiber to less than 10% of the peak power in said cavity. It is well known however that single mode fibers are sensitive to peak powers. It is also well known to use output couplers (the scope of recitation "output coupler" is treated broadly to include elements before and after the output coupler) limiting the power in single mode fibers to protect them. See, for example either of Harter I (FIG. 4) or Galvanauskas I. To protect the single mode fiber therefore it would have been obvious to use an output coupler to reduce the peak power.

Additionally, since reducing the power is art recognized result-effecting variables/parameters, as per established patent law precedent (see, for example M.P.E.P. § 2144.05) therefore it would have been obvious to optimize (for example by routine experimentation) the peak power in the single mode fiber to be less than 10% of the peak power in the cavity.

25. Claims 43-45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann I further in view of either Harter I or Galvanauskas I, further in view of Arbore and Galvanauskas II.

The combination of Wyatt with Fermann I with Harter I, or with Galvanauskas I, fails to specifically disclose using a chirped periodically polled LiNbO3. Arbore however discloses using a LiNbO3 having chirped grating to simultaneously chirp adjust (and thus compress) and frequency double ultra-short pulses. See, for example the front page. Arbore also recognizes the importance of both compressing pulses and controlling their frequency. Both Arbore and Galvanauskas II recognize the benefit of using periodically poled LiNbO3 for harmonic generation because of its large nonlinear coefficient. To simultaneously chirp adjust (and thus compress) and frequency double pulses using a large non-linear coefficient (and therefore an efficient) material therefore it would have been obvious to modify the combination of Wyatt with Fermann I with Harter I, or with Galvanauskas I, to use PPLN as a frequency doubler and a pulse compressor.

Double Patenting

26. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned

with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

27. Claims 1-8, 10, 11, 13-26, 30-46, 5, and 55-57 rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of Fermann II. Although the conflicting claims are not identical, they are not patentably distinct from each other.

For example, Claim 25 of Fermann II anticipates claim 1 of the present application. And claim 25 modified (and motivated) by the prior art applied above (under the 102 and 103 rejections), if necessary, renders obvious the remaining claims.

28. Claims 1-8, 10, 11, 13-26, 30-46, 5, and 55-57 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4 of U.S. Pat. No. 6,275,512 to Fermann [hereinafter "Fermann III"].

For example, claim 1 of Fermann III modified (and motivated) by Fermann I to include a mode filter would render obvious claim 55 of the present application. The other claims of the present application are also rendered obvious in view of claims 1-4 of Fermann III further in view of the prior art applied above (under the 102 and 103 rejections).

Arguments by Applicant Presented in Prior Responses

29. Applicant's prior arguments have been considered, but they are found non-persuasive. These arguments are addressed within the explanations above for the anticipatory and obviousness rejections herein.

CLOSURE

30. Any inquiry concerning this or any earlier communication should be directed to examiner Hrayr A. Sayadian, who may normally be reached Monday through Friday, 7:30 am-4:00 pm, on (571) 272-7779.

If attempts to reach the examiner by telephone are unsuccessful, his supervisor, Minsun O. Harvey, may be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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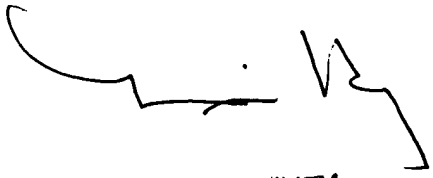

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